WHAT IS CLAIMED IS:

1. A Fiber Bragg Grating interferometer embedded in an optical fiber for a chromatic dispersion compensation of an optical signal, said FBG interferometer comprising:

   a first and a second overlapping gratings, each having an identical predetermined chirp rate and a wide band reflectivity response, the first grating having a first refractive index modulation for providing a substantially total reflectivity of said first grating, the second grating having a second refractive index modulation being lower than said first one for providing a partial reflectivity of said second grating, said gratings being longitudinally shifted from one another by a predetermined distance L, thereby defining a Fiber Bragg Grating Gires-Tournois interferometer cavity therebetween for providing the chromatic dispersion compensation of the optical signal.

2. The Fiber Bragg Grating interferometer according to claim 1, wherein each of said refractive index modulations extends inside a cladding of said optical fiber.

3. The Fiber Bragg Grating interferometer according to claim 1, further comprising a third overlapping grating having a wide band reflectivity response and the same predetermined chirp rate than said first and second gratings, said third grating being longitudinally shifted by the same predetermined distance L relatively to the second grating for defining a second cavity between said second and third gratings, thereby providing a multi-cavity FBG Gires-Tournois interferometer.

4. The Fiber Bragg Grating interferometer according to claim 3, further comprising a plurality of additional shifted overlapping gratings defining a plurality of additional

cavities longitudinally distributed with said first and second cavities along said optical fiber.

5. The Fiber Bragg Grating interferometer according to claim 1, wherein said gratings are written simultaneously in the optical fiber with a complex phase mask predefining a relative position of each of said gratings.

6. The Fiber Bragg Grating interferometer according to claim 1, wherein each of said gratings are written with polarized UV beams.

7. The Fiber Bragg Grating interferometer according to claim 1, wherein said optical fiber embedding the FBG interferometer is UV exposed for modifying a refractive index of said optical fiber.

8. The Fiber Bragg Grating interferometer according to claim 1, wherein the reflectivity of said second grating depends on an optical frequency of said optical signal.

9. An optical system for a chromatic dispersion compensation of an optical signal comprising:

a plurality of FBG interferometers, each comprising:

a first and a second overlapping gratings, each having an identical predetermined chirp rate and a wide band reflectivity response, the first grating having a first refractive index modulation for providing a substantially total reflectivity of said first grating, the second grating having a second refractive index modulation being lower than said first one for providing a partial reflectivity of said second grating, said

gratings being longitudinally shifted from one another by a predetermined distance L, thereby defining a Fiber Bragg Grating Gires-Tournois interferometer cavity therebetween; and

coupling means for cascading said plurality of FBG interferometers, said coupling means having an input port for receiving the optical signal and an output port for outputting said optical signal after successive reflections through each of said plurality of FBG interferometers, thereby providing the chromatic dispersion compensation of the optical signal.

10. The optical system according to claim 9, wherein said coupling means comprises a circulator having a plurality of intermediate ports, each of said intermediate ports receiving one of said plurality of FBG interferometers.

11. The optical system according to claim 9, wherein said coupling means comprises a series of couplers.

12. The optical system according to claim 9, further comprising a plurality of temperature controlling means, each being operationally connected to one of said plurality of FBG interferometers for thermo-optically shifting a spectral response thereof.

13. The optical system according to claim 12, wherein each of said plurality of temperature controlling means comprises a thermo-electric cooler.

14. A Fiber Bragg Grating based dispersion compensator comprising:

a multi-cavity Fiber Bragg Grating interferometer comprising:

a first, a second and a third overlapping gratings, each having an identical predetermined chirp rate and a wide band reflectivity response, the first grating having a first refractive index modulation for providing a substantially total reflectivity of said first grating, each of said second and third gratings respectively having a second and a third refractive index modulation being lower than said first one for providing a partial reflectivity of each of said gratings, the second grating being longitudinally shifted in a defined direction by a predetermined distance L relatively to the first grating for defining a first cavity between said first and second gratings, the third grating being longitudinally shifted in the same defined direction by the same distance L relatively to the second grating for defining a second cavity between said second and third gratings, thereby providing a multi-cavity FBG Gires-Tournois interferometer; and

coupling means operationally connected to said multi-cavity FBG interferometer, said coupling means having an input port for receiving an optical signal and an output port for outputting said optical signal after a reflection thereof through said multi-cavity FBG interferometer, thereby providing a chromatic dispersion compensation of said optical signal.

15. The Fiber Bragg Grating based dispersion compensator according to claim 14, wherein said coupling means comprises a circulator having an intermediate port for receiving said multi-cavity FBG interferometer.

16. The Fiber Bragg Grating based dispersion compensator according to claim 14, wherein said coupling means comprises a coupler.

17. The Fiber Bragg Grating based dispersion compensator according to claim 14, further comprising a temperature controlling means operationally connected to said multi-cavity FBG interferometer for thermo-optically shifting a spectral response thereof.

18. The Fiber Bragg Grating based dispersion compensator according to claim 17, wherein said temperature controlling means comprises a thermo electric cooler.

19. The Fiber Bragg Grating based dispersion compensator according to claim 14, wherein said multi-cavity FBG interferometer comprises a plurality of additional shifted overlapping gratings defining a plurality of additional cavities.

20. The Fiber Bragg Grating based dispersion compensator according to claim 14, wherein the respective reflectivity of each of said second and third gratings depends on an optical frequency of said optical signal.

21. The Fiber Bragg Grating based dispersion compensator according to claim 14, further comprising a second multi-cavity FBG interferometer operationally connected to said coupling means, said optical signal being outputted after successive reflections through each of said multi-cavity FBG interferometers.

22. The Fiber Bragg Grating based dispersion compensator according to claim 21, wherein said coupling means comprises a circulator having two intermediate ports, each receiving one of said multi-cavity FBG interferometers.

23. The Fiber Bragg Grating based dispersion compensator according to claim 21, wherein said coupling means comprises a series of couplers.

24. The Fiber Bragg Grating based dispersion compensator according to claim 21, wherein the respective reflectivity of each of said second and third gratings of each of said multi-cavity FBG interferometer depends on an optical frequency of said optical signal.

25. The Fiber Bragg Grating based dispersion compensator according to claim 21, further comprising a first and a second temperature controlling means, each being operationally connected to one of said multi-cavity FBG interferometers for thermo-optically shifting a spectral response thereof.

26. The Fiber Bragg Grating based dispersion compensator according to claim 25, wherein each of said temperature controlling means comprises a thermo-electric cooler.

27. The Fiber Bragg Grating based dispersion compensator according to claim 19, further comprising a second multi-cavity FBG interferometer operationally connected to said coupling means, said optical signal being outputted after successive reflections through each of said multi-cavity FBG interferometers.

28. The Fiber Bragg Grating based dispersion compensator according to claim 25, wherein each of said first and second temperature controlling means respectively applies a first and a second temperatures to each of said interferometers for providing a tunable dispersion compensation.